



New OLED Cathode Materials with Tailored Low Work Function

Organic light-emitting devices (OLEDs) utilize organic materials to produce light, and therefore consume relatively little power. OLEDs are composed of three essential elements: The anode, a light-emitting layer, and the cathode. The requirements of the cathode and anode limit the types of organic material that can be used for the light-emitting layer. The work functions of the conductors must match the appropriate energy levels of the light-emitting material. These devices have a high failure rate, because the metal cathode layer often degrades or reacts with the organic layer. Recent improvements increase performance but add manufacturing steps.

Often, the ideal light-emitting material cannot be used due to the above limitations. The novel low work-function metal complexes developed by researchers at Colorado State University offer a viable alternative to the standard metal cathode technology. These complexes can be electromechanically or chemically reduced to produce a solid material that is electrochemically conductive. These reduced materials have a low work function and therefore can function as cathodes for the OLED. The complexes can be deposited at relatively low temperatures to form thin conductive films.

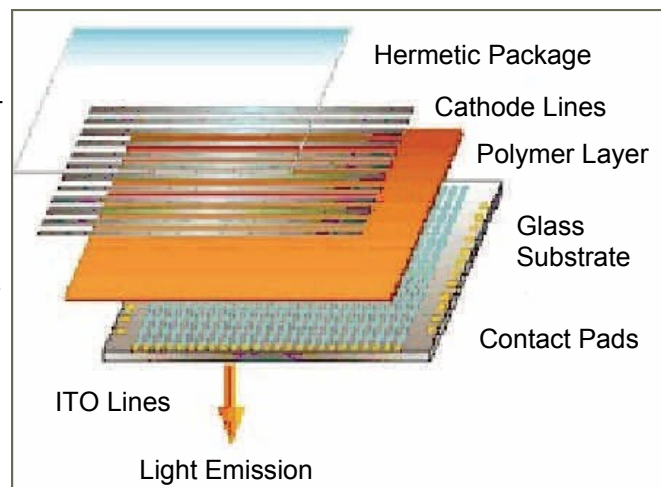
The metal complex can be specifically chosen to match the energy and work function of an ideal light-emitting material. The cathode layer can, in principle, be covered by any conductive material to provide a stable contact. Because the cathode and light-emitting layers are both organic complexes, the contact will last longer and use less energy than the conventional technology available today.

Patent Information

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Features and Benefits

- Low work function of the cathode materials results in low operating voltages
- Cathode work function is easily optimized to match the active organic layer
- Interface between cathode and light-emitting layer lasts longer than conventional technology
- Novel cathode material is easily integrated into current device fabrication processes.

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